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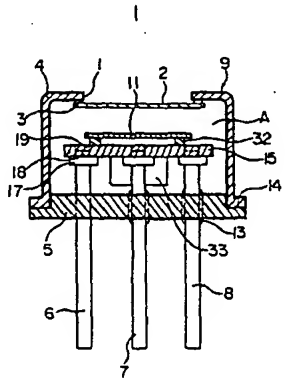
(54) **PYROELECTRIC ELEMENT.**

(57) A pyroelectric body (11) which senses infrared rays is contained in a case consisting of a can (4) and a stem (5) both made of an alloy having a composition of 55 % Fe, 28 % Ni and 17 % Co. A filter (2) for closing a window (1) which is provided so as to introduce infrared rays into the interior of the case is fixed to the periphery of the window with a fusion material (3) such as silver solder. On the upper and lower surfaces of the pyroelectric body formed are an electrode for absorbing infrared rays and an electrode for leading out an electric signal representing the detection of infrared rays to a conductive bonding agent. The absorption electrode is a thin layer of an infrared ray absorbing material; the take-out electrode is of the same material, or of a corrosion-resisting material, and is a layer thicker than that of the absorption electrode. Terminal pins (6,7,8) extending from the interior to the exterior of the case so as to take an electric signal representing the detection of infrared rays to the outside are provided with flat collars (17) projecting radially in the vicinity of the inner ends of the pins. A printed board (15) used to process the electric signal in the interior of the case is supported stably and in parallel with the collars.



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Technical Field

The present invention relates to a pyro l ctric device used as an infrared-ray sensor and heat sensitive device.

Background Art

A pyroelectric device is an infrared-ray sensor using a pyroelectric element composed of a material such as, for example, PVDF (polyvinylidene fluoride), PZT (lead zirconate titanate) or the like and used as a sensing device such as a flame sensor disposed in a tunnel or the like to detect infrared rays of flame when fire is caused or an intrusion detector used in a security system for detecting infrared rays from a human body, and the like.

Conventionally, as shown in Figure 6, the pyroelectric device is arranged such that a pyroelectric member 40 and a printed board 41 are disposed on a stem 42 composed of metal or like as a base and sealed by a can 43 as a frame member composed of a steel plate or the like covering the upper periphery thereof, the printed board 41 including circuit elements 61 such as a field effect transistor (FET) and the like mounted thereon to take out the intensity of infrared rays detected by the pyroelectric member 40 in the form of an electric signal. More specifically, the can 43 is provided with a light transmitting window hole 44 through the ceiling thereof so that unillustrated infrared rays emitted from the flame of, for example, a fire or the like are irradiated to the pyroelectric member 40 through the window hole 44. A filer 45 composed of, for example, silicon which is excellent in infrared ray transmittance is disposed over the window hole 44 to seal the same and nable the infrared rays to be transmitted therethrough. The sealing by and the bonding of the filter 45 is performed by forming an adhesive-bonding portion 46 by an adhesive such as an epoxy resin or the like.

Although the casing of the pyroelectric device is composed of the can 43 and stem 42 as described above, the sealed type pyroelectric device is formed in such a manner that the can 43 and stem 42 are fused or adhesivebonded to each other at the sealing portion 47 in the periphery of the stem. As shown in the figure, three lead terminals, that is, a ground terminal 48, a source terminal 49 and a drain terminal 50 are taken out from the stem 42 and the aforesaid electric signal is output to an unillustrated main lectric circuit through these lead terminals. In this case, although th ground terminal 48 is directly connected to the stem 42, the two other terminals, that is, the source terminal 49 and drain terminal 50 are fixed to the stem 42 in a sealed state through insulating memb rs 51 so as to be insulated from the st m 42.

The part of the pyroelectric memb r 40 will b described in detail with reference to the enlarged cross sectional view shown in Figure 7. The pyroelectric member 40 is disposed on the printed board 41 through a base member 58, and keyhole-shaped electrodes 52 and 53 each composed of a projecting rectangular portion and a disc-shaped portion are formed both on the upper and lower surfaces of the pyroelectric member 40 by vapor deposition or the like. The disc-shaped portions 54 and 55 of these electrodes are disposed to confront to each other through the pyroelectric member 40, and the projecting portions 56 and 57 thereof are disposed to extend from the disc-shaped portions 54 and 55 to the right and left sides of the pyroelectric member 40, respectively. The electrodes 52 and 53 are composed of an infrared ray absorbing material such as nickel chromium alloy, gold black or the like.

The pyroelectric member 40, base member 58 and printed board 41 are bonded and fixed to each other through a suitable material, respectively, and electric conductive adhesives 59 and 60 are applied between the electrodes 52 and 53 on the upper and lower surfaces of the pyroelectric member 40 and unillustrated circuit patterns of the printed board 41 so that electric conductivity is established therebetween. An electric conductive adhesive mixed with silver filler or the like is used as the electric conductive adhesives 59 and 60.

When the aforesaid pyroelectric device is used as, for example, a flame sensor, it is required to operate normally as well as safely and securely in a wide range of circumferential humidities or under the existence of corrosive gases in addition to in a wide range of circumferential temperatures, taking it into consideration that the pyroelectric device is used in severe environmental conditions in the indoors and outdoors such as, for example, in a factory, parking area, hot-spring resort, tunnel and the like. When an accelerated operation test is executed to the conventional pyroelectric device arranged as described above to confirm its operation to satisfy the above requirement, since the can 43 is composed of a steel plate and the filter is composed of silicon, a problem arises in that the surface of the can 43 rusts and further the occurrence of the rust is naturally accelerated under the existence of the corrosive gases as well as a gap is formed in the adhesive-bonding portion 46 adjacent to the window hole 44 and the filter 45 cracks due to th difference of the thermal expansion coefficients thereof.

Further, the pyroelectric device includes the filter 45 fixed over the window hole 44 of the can 43 by the resin adhesive-bonding portion 46. Since

the bonding portion 46 is composed of the resin, a gap is liable to b form d du to the ventilating property and deterioration of th resin, although this is dependent on the characteristics of the resin, and thus the life of airtightness made by the bonding portion 46 is very short. That is, a problem arises in that moisture contained in the outside air or corrosive gases penetrate through the bonding portion 46 and corrode the pyroelectric member 40 and circuit elements 61 to lower the reliability of the pyroelectric device.

Further, in this type of pyroelectric device, the electrodes 52 and 53 formed on the surfaces of the pyroelectric member 40 have a function of electrically connecting to the pyroelectric member 40 as well as the other function of containing infrared rays incident on the pyroelectric member 40. More specifically, it is ideal that the electrode 52 as a light receiving surface absorbs the infrared rays without reflecting the same and the electrode 53 on the backside thereof reflects the infrared rays without causing the same to be transmitted therethrough so as to improve the infrared ray absorbing efficiency to the pyroelectric member 40. Therefore, the electrodes 52 and 53 are individually formed to a predetermined optimum thickness.

The electric conductive adhesives 59 and 60 are applied to the electrodes 52 and 53, respectively, and when the adhesives are cured, a tension is applied to the electrodes 52 and 53. Since the electrodes 52 and 53 are formed thin for the purpose of absorbing infrared rays, and thus when the thin and slender electrodes 52 and 53 are subjected to corrosion, vibration or the like, they may be easily cut off at the boundary between them and the adhesives 59 and 60. In particular, when the pyroelectric device is used as a flame sensor for detecting infrared rays, severe regulations regarding durability is applied to the pyroelectric device and it may be installed at a place with very bad environmental conditions, by which the pyroelectric device is damaged.

Disclosure of the Invention

Therefore, an object of the present invention is to electrically connect electrodes to circuit patterns of a printed board securely without reducing the infrared ray absorbing efficiency of a pyroelectric element.

Another object of the present invention is to provide a pyroelectric device capable of maintaining a sufficient airtightness and having a casing with a weather resistanc even if environmental conditions such as a temperature and the like are severely changed, without damaging a filter mounted to a window portion of the casing.

A further object of the present invention is to improve an airtightness when a window hole of a can is sealed with a filter and also to increase strength thereof.

A still further object of the present invention is to improve the paralleling property of a printed board to a stem when the printed board is mounted on the stem so as to provide a pyroelectric device excellent in a mechanical property and performance with a good workability.

To achieve these objects, according to the present invention, there is provided a pyroelectric device, which comprises a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, the printed board having an electric circuit for outputting the infrared rays detected by the pyroelectric member as an electric signal, a can having a window hole and fixed to the stem in an airtight state, and a filter for sealing the window hole, each of the electrodes formed on the upper and lower surfaces of the pyroelectric member including an absorbing electrode portion for absorbing infrared rays and a drawing electrode portion for drawing an electric signal output by detecting the infrared rays to an electric conductive adhesive, the absorbing electrode portion being composed of an infrared ray absorbing material formed to a thin layer, the drawing electrode portion being composed of the same material formed to a layer thicker than that of the absorbing electrode portion or composed of a corrosion resistive material.

The can having the window hole for the filter and the stem which cooperatively form a casing are composed of alloy having the constitution of Fe; 55%, Ni: 28% and Co: 17%. When the window hole is sealed by the filter, the filter is abutted against the circumference of the window hole through a fusing agent and the fusing agent is melted and then solidified to fix the filter to the window hole so that the inside of the pyroelectric device is made to a sealed state. Terminal pins stand on the stem in communication with the outside and inside of the pyroelectric device to support the printed board and take out the electric signal output from the electric circuit of the printed board. The terminal pins have collars radially projecting at the extreme ends thereof on the inner side of the pyroelectric device, whereby when the extreme ends are inserted into the pin holes formed in the printed board, the collars are abutted against the printed board to support the same parallel to the stem.

Brief Description of the Drawings

Figur 1 is a longitudinal cross sectional view showing an embodiment of a pyroelectric device according to the present invention;
Figure 2 is a plan view showing the main internal portion of Figure 1;
Figure 3 is a schematic longitudinal cross sectional view of Figure 2;
Figure 4 is a longitudinal cross sectional view showing another embodiment in the same way as Figure 3;
Figure 5 is a longitudinal cross sectional view showing of further embodiment in the same way as Figure 3;
Figure 6 is a longitudinal cross sectional view showing a conventional pyroelectric device; and
Figure 7 is a longitudinal cross sectional view schematically showing a portion of Figure 6.

Best Mode for carrying Out the Invention

The arrangement of an embodiment of the present invention will be described by using the drawings. In Figure 1, a pyroelectric device includes a main body casing composed of a can 4 and a stem 5 both of which are formed of Kovar, the can 4 having a window hole 1 and a filter 2 composed of a silicon plate (or laminated interference filters) and fused and fixed to the window hole 1 by a fusing agent 3 of silver solder. A gold lectrolytic plating is applied to the can 4 and the stem 5 arranged as described above as a surface treatment film 9. Three lead terminals, that is, a ground terminal 6, a source terminal 7 and a drain terminal 8 are disposed to the stem 5 and connected to a main electric circuit of, for example, an unillustrated flame sensor or the like. In this case, although the ground terminal 6 is directly fixed to the stem 5 in contact therewith, the other two terminals are fixed to the stem 5 in a sealed state through insulating members 13 so as to be insulated from the stem 5.

Since Kovar (Fe : Ni : Co = 55 : 28 : 17) has a thermal expansion coefficient $\alpha = 4.7 \times 10^{-6}/°C$ while silicon used for the filter 2 has a thermal expansion coefficient $\alpha = 2.4 \times 10^{-6}/°C$, the difference of the thermal expansion coefficients is small. Therefore, when the can 4 is formed of Kovar, no mechanical trouble due to the difference of the thermal expansion coefficients occurs at a junction portion. Since a steel plate used for a can in prior art has a thermal expansion coefficient $\alpha = 13.2 \times 10^{-6}/°C$, the employment of th Kovar is very useful as compared with the steel plate. Further, when sapphire is used for the filter 2, since the sapphire has a thermal expansion co fficient $\alpha = 5.3 \times 10^{-6}/°C$, a difference of the thermal expansion coefficients can be further reduced so that a troubl due to the difference of the thermal expansion coefficients can be prevented in the same way.

Further, when the stem 5 is also composed of Kovar, since the can 4 and the stem 5 have the same thermal expansion coefficient, a trouble at the sealing portion 14 such as a mechanical strain or damage can be avoided. That is, the sealing portion 14 is entirely free from a trouble due to the difference of thermal expansion coefficients regardless of that it is fused, adhesive-bonded or caulked. The sealing portion 14 of the present embodiment is sealed and joined by electric spot welding making use of resistance heating, and in this case a gold-plated treatment film existing there causes an disadvantage, and thus the treatment film 9 is not provided with the sealing portion 14. When the treatment film 9 is nonelectrolytically plated with nickel, it need not be omitted from the sealing portion 14.

When the stem 5 is composed of Kovar as described above and further the three terminals 6, 7 and 8 are also composed of Kovar, these terminals can be advantageously sealed by using glass as the insulating member 13. In this case, the three Kovar terminals 6, 7 and 8 are also subjected to a surface treatment. The can 4 is joined to the stem 5 at the sealing portion 14 to integrally form the casing. Although the gold plating is shown as the corrosion-resistant surface treatment film 9 in the above embodiment, a film coated with organic polymer such as a polytetrafluoroethylene resin may be used.

A process for joining the filter 2 to the can 4 is such that the fusing agent 3 composed of silver solder is disposed to the circumference of the window hole 1 of the can 4 and the filter 2 is placed thereon. Then, the fusing agent 3 is heated to be melted under a reducing atmosphere excluding oxygen and thereafter cooled. Thus, the fusing agent 3 gets to fit the circumference of the window hole 1 of the can 4 and the outer periphery of the filter 2 so that the filter 2 can be fixed in a perfectly sealed state.

This joint made by the fusing is advantageous in the point of a sealing property and strength as compared with the joint made by a resin adhesive, and the penetration of the air from outside into the inside A of the frame member can be completely shut off. The material used for the fusing agent may be, for example, fusing glass in addition to the silver solder.

When this process is ex cuted in th atmosphere of a vacuum state, the inside A of the frame member can be made to the vacuum state, and thus the affect of the humidity and the like in a remaining gas to the various functional elements in

the inside A of the frame member can be prevented. A conventional resin adhesive cannot keep the inside A of the fram member to th vacuum state because of the insufficient strength thereof. The vacuum state in the inside A of the frame member may be established by forming a pin hole through the stem 5, absorbing a gas therethrough, and thereafter sealing the pin hole. Further, the remaining gas may also be removed by replacing the gas in the inside A of the frame member with an inert gas such as a nitrogen gas of high purity.

Further, when the inside A of the frame member is made to the vacuum state, the performance of the device itself can be improved. More specifically, a pyroelectric member 11 as a member for detecting infrared rays changes its electric characteristics with heat of the infrared rays absorbed and usually the absorbed infrared rays are partially radiated in some forms. Thus, when the inside A of the frame member is kept to the vacuum state, no thermal convection is generated in the inside and thus a thermal radiation due to a gas flow can be prevented. Therefore, a sensitivity and response speed as the pyroelectric device can be improved and at the same time an external noise can be reduced.

Various functional elements such as the pyroelectric member 11, a circuit element 33 such an FET and the like are assembled in the casing to fill the function as a pyroelectric device. The ground terminal 6, the source terminal 7 and the drain terminal 8 serving as terminal pins, which support the printed board 15 thereon and are connected to wirings for taking out an electric signal from the pyroelectric member 11, are provided with flatshaped collars 17 disposed in the extreme end regions of the respective pins on the inner side of the casing and arranged as the terminal pins with the collars (hereinafter, referred to as kneel pins) . When the collar 17 is provided for each pin, an extreme end portion 18 projects from the collar 17. Each extreme end portion 18 is inserted into a pin hole 19 in contact therewith which is formed on the printed board 15 and fixed thereto by soldering or the like. At this time, the printed board 15 is fixed by being abutted against the upper surfaces of the collars 17. The placement of the printed board 15 on the collars 17 of the three terminal pins enables the pyroelectric member 11 to be disposed in parallel with the plane of the filter and the like in the casing together with the printed board 15. More specifically, an advantage can be obtained in that a pyroelectric device with high accuracy can be effectively manufactured by this arrangement.

The pyroelectric member 11 of the present invention will be described in more detail with reference to Figures 2 and 3. The keyhol -shaped electrodes 20 and 21 formed on the upper and lower surfaces of the pyroelectric member 11 include disc-shap d absorbing electrod portions 22 and 23 dispos d to confront to each other through the pyroelectric member 11, respectively, as well as drawing electrode portions 24 and 25 projecting respectively in the opposite directions from the absorbing electrode portions 22 and 23. The ends of the drawing electrode portions 24 and 25 on the opposite sides of the absorbing electrodes are electrically connected to unillustrated circuit patterns of the printed board 15, which is located below the electrodes 20 and 21 through an element base 32, by electric conductive adhesives 26 and 27.

When the electrode 20 is manufactured, first, a keyhole-shaped thin layer of a predetermined thickness is formed on one side of the pyroelectric member 11 by vapor deposition or the like. Thereafter, a layer is further laminated only to the portion projecting from the disc-shaped portion of the keyhole shape in the same way. Thus, the absorbing electrode portion 22 having a layer of a predetermined thickness is formed on the disc-shaped portion and the drawing electrode 24 having a layer thicker than that of the absorbing electrode 22 is formed on the projecting portion. The electrode 21 is also formed by the same way as the electrode 20 so that the projecting portion of the drawing electrode portion 25 projects in the direction opposite to that of the drawing electrode portion 24. As a result, since the drawing electrode portions 24 and 25 formed with a narrow width have a thicker layer, the electric conductivity and durability of these electrode portions are improved. The method of manufacturing the electrodes 20 and 21 are not limited to the above mentioned method, but a certain thickness of a layer may be previously formed to each of the drawing electrode portions 24 and 25 and the absorbing electrode portions 22 and 23 may be formed thereon so that they have a predetermined thickness. Further, as another method, the absorbing electrode portions and the drawing electrode portions may be individually formed so that the former electrode portions have a thicker layer than the latter electrode portions.

Another embodiment of the electrodes 20 and 21 will be described with reference to Figure 4. Although the arrangement of these electrodes and the method of making the same are substantially the same as those of the aforesaid electrodes, a different point is that the material of absorbing electrode portions is different from that of drawing electrode portions. More specifically, at the first layer formation executed by vapor deposition or the like, only the disc-shaped portions of keyhole-shapes are formed as the absorbing electrode portions 28 and 29 by using an infrared ray absorbing material such as nickel chromium alloy or the like.

Then, when layers are laminated for drawing electrode portions 30 and 31, a good conducting material such as platinum or other corrosion resistive material is used to form projecting portions so that the end portions of the drawing electrode portions 30 and 31 are overlaid with the absorbing electrode portions 28 and 29. With this arrangement, the absorbing electrode portions 28 and 29 as the disc-shaped portions of the electrodes 20 and 21 are composed of the nickel chromium alloy while the projecting portions of the drawing electrode portions 30 and 31 are composed of platinum, and electric conductive adhesives 26 ad 27 are applied to the portion of the platinum. As a result, the electric conductivity and durability of the drawing electrodes portions 30 and 31 are improved in the same way as the electrodes shown in Figures 2 and 3.

Further, as another method, at the first layer formation, a keyhole-shaped layer may be formed by using nickel chromium alloy and thereafter platinum may be laminated only on the projecting portion of the keyhole shape, as shown in Figure 5. Thus, finally it suffices that nickel chromium alloy is disposed on the light receiving surface of the pyroelectric member 11 and platinum is disposed on the surface jointed to the electric conductive adhesives 26 and 27.

The operation of the pyroelectric device will be described here. The pyroelectric member 11 detects infrared rays passing through the filter 2, converts the same to an electric signal, and outputs the electric signal. The electric signal is applied to the gate of an unillustrated FET mounted on the printed board 15 to be amplified so that the signal is quantitatively detected as an amount of electricity proportional to an amount of the infrared rays. The pyroelectric member 11 may be composed of PZT (lead zirconate titanate), tantalic acid lithium, titanate, PVDF (polyvinylidene fluoride), the copolymer thereof, or the like.

As described above, since the surface of the can 4 and the stem 5 constituting the casing is coated with the surface treatment film 9 composed of the gold or nickel plated layer, the surface of the pyroelectric device is not rusted to lose a weather resistance even under the severe environmental conditions of particularly high humidity, and thus a practically applicable pyroelectric device can be obtained. Further, since the can 4 and the stem 5 constituting the casing are composed of Kovar having a thermal expansion coefficient fairly near to that of the filter 2, strain, which results from the difference of thermal expansion coefficients due to a thermal variation, is not caused not only at the junction between the can 4 and the stem 5 composed of the same material but also at the junction between the can 4 and the filter 2 attached to the can 4. Therefore, no gap is ganerated at the junction between different materials and no crack is made to the filter 2 ev n under the s ver environmental conditions and thus a practically applicable device capable of maintaining an airtightness for a long time can be obtained.

In addition to the above arrangement, the filter 2 is strongly fixed to the window hole 1 of the can 4 in such a manner that the fusing agent 3 such as silver solder or the like is placed to the circumference of the window hole 1, melted and then solidified. As a result, the window hole 1 can be completely sealed so that the corrosion of the pyroelectric member 11 and the like caused by the penetration of the air from outside can be prevented. Further, since the joint strength of the respective portions is improved as described above, the inside A of the frame member can be made to a reduced pressure (vacuum) state, by which the affect of a remaining gas can be removed, if it remains within the frame member.

Further, since the terminal pins 6, 7 and 8 standing on the stem 5 are arranged as the kneel pins each having the collar 17 radially projecting at the extreme end thereof on the inner side of the casing, the printed board 15 can be mounted with good workability in such a manner that the extreme ends 18 of the terminal pins axially extending from the collars 17 are inserted into the pin holes 19 formed in the printed board 15 and the lower surface of the printed board 15 is received by the collars 17, and thus the pyroelectric member 11 mounted on the printed board in parallel therewith can be disposed in parallel with the filter 2. With this arrangement, an effect can be obtained in that workability in production is improved and a pyroelectric device with high accuracy in construction and performance is provided.

Finally, since the absorbing electrode portions of the electrodes formed on the upper and lower surfaces of the pyroelectric member 11 have a thickness or material different from those of the drawing electrode potions, an effect can be obtained in that a corrosion resistive pyroelectric device excellent in durability is obtained.

Claims

1. A pyroelectric device comprising:

   a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;

   a can having a window hole and fixed to said stem in an airtight state; and

a filter for sealing said window hole, each of said electrod s formed on the upper and lower surfaces of said pyroelectric member including an absorbing electrode portion composed of an infrared ray absorbing material and formed as a thin layer and a drawing electrode portion communicating with said absorbing electrode portion and formed as a layer thicker than that of said absorbing electrode portion.

2. A pyroelectric device comprising:

a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;

a can having a window hole and fixed to said stem in an airtight state; and

a filter for sealing said window hole, each of said electrodes formed on the upper and lower surfaces of said pyroelectric member including an absorbing electrode portion composed of an infrared ray absorbing material formed as a thin layer and a drawing electrode portion communicating with said absorbing electrode portion and composed of a corrosion resistive material.

3. A pyroelectric device according to claim 1 or 2, wherein said can and said stem are composed of alloy having the component of Fe: 55%, Ni: 28%, and Co: 17%.

4. A pyroelectric device comprising:

a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;

a can having a window hole and fixed to said stem in an airtight state; and

a filter for sealing said window hole, said can and said stem being composed of alloy having the component of Fe: 55%, Ni: 28%, and Co: 17%.

5. A pyroelectric device according to claim 1, 2, 3 or 4, wherein when said window hole is sealed by said filter, said filter is abutted against the circumference of said window hole through a fusing agent and said fusing agent is melted and then solidified to sealedly fix said filer to said window hole.

6. A pyroelectric device according to claim 1, 2. 3, 4 or 5, wherein terminal pins stand on said stem in communication with the outsid and inside of said pyroelectric device to support said printed board and take out said electric signal output from the electric circuit of said printed board, said terminal pins having projecting portions radially projecting at the extreme ends thereof on the inner side of said pyroelectric device, whereby when said extreme ends are inserted into pin holes formed in said printed board, said projecting portions are contacted with said printed board to flatly support the same.

AMENDED CLAIMS

[which has been received by the International Bureau on 19 February, 1993; originally filed claims 3 and 4 are deleted; claims 1, 2 and 5 are amended; new claims 6 and 7 are added. (2 pages)]

1. (Amended) A pyroelectric device comprising:

a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;

a can having a window hole and fixed to said stem in an airtight state; and

a filter for sealing said window hole, each of said electrodes formed on the upper and lower surfaces of said pyroelectric member including an absorbing electrode portion composed of an infrared ray absorbing material and formed as a thin layer and a drawing electrode portion communicating with said absorbing electrode portion and formed as a layer thicker than that of said absorbing electrode portion, an electric conductive member being connected to said drawing electrode portion for electrically connecting between said drawing electrode portion and said printed board.

2. (Amended) A pyroelectric device comprising:

a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;

a can having a window hole and fixed to said stem in an airtight state; and

a filter for sealing said window hole, each of said electrodes formed on the upper and

lower surfaces of said pyroelectric member including an absorbing el ctrode portion composed of an infrared ray absorbing material formed as a thin layer and a drawing electrode portion communicating with said absorbing electrode portion and composed of a corrosion resistive material, an electric conductive member being connected to said drawing electrode portion for electrically connecting between said drawing electrode portion and said printed board.

3. (Deleted)

4. (Deleted)

5. (Amended) A pyroelectric device comprising:
a stem having a pyroelectric member including electrodes formed on the upper and lower surfaces thereof for detecting infrared rays and a printed board mounted thereon, said printed board having an electric circuit for outputting the infrared rays detected by said pyroelectric member as an electric signal;
a can having a window hole and fixed to said stem in an airtight state; and
a filter fixed to the circumference of said window hole by an electric conductive fusing agent for sealing said window hole.

6. (Added) A pyroelectric device according to claim 1 or 2, wherein said electric conductive member is an electric conductive adhesive applied between said electrodes and said printed board.

7. (Added) A pyroelectric device according to claim 5, wherein said fusing agent is a solder.

Brief statement of amendment under article 19(1)

Claims described in the attached sheets differ from the originally filed claims in the following points:

Claim 1 is amended to clarify that an electric conductive member is connected to the drawing electrode portion for electrically connecting between the drawing electrode portion and the printed board;

Claim 2 is amended to clarify that an electric conductive member is connected to the drawing electrode portion for electrically connecting between the drawing electrode portion and the printed board;

Claim 3 is deleted;

Claim 4 is deleted;

Claim 5 is amended to clarify that the fusing agent has an electric conductivity;

Claim 6 is newly added; and

Claim 7 is n wly added.

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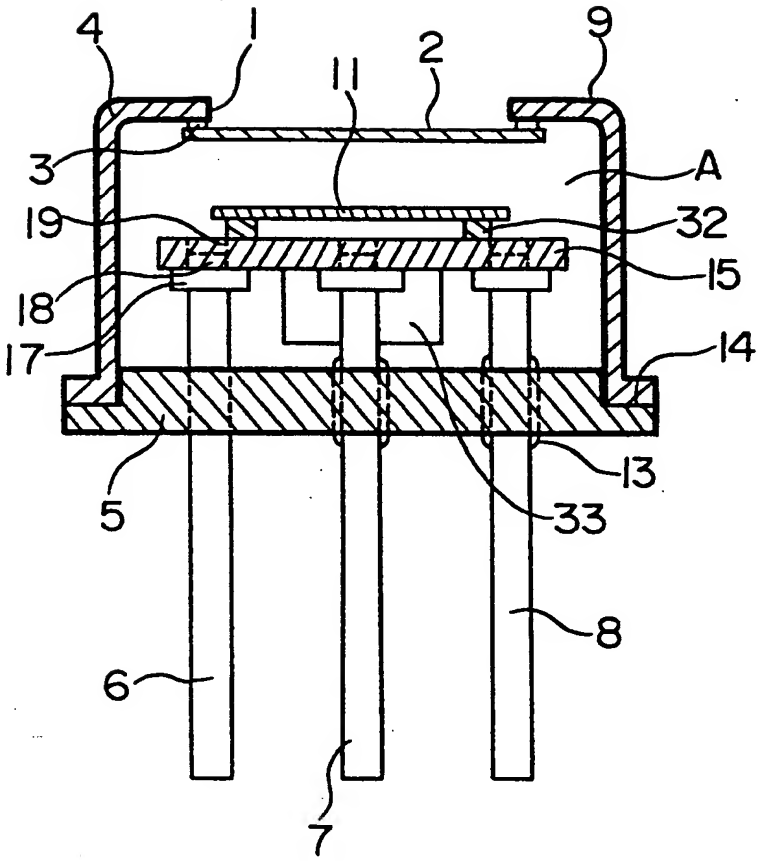

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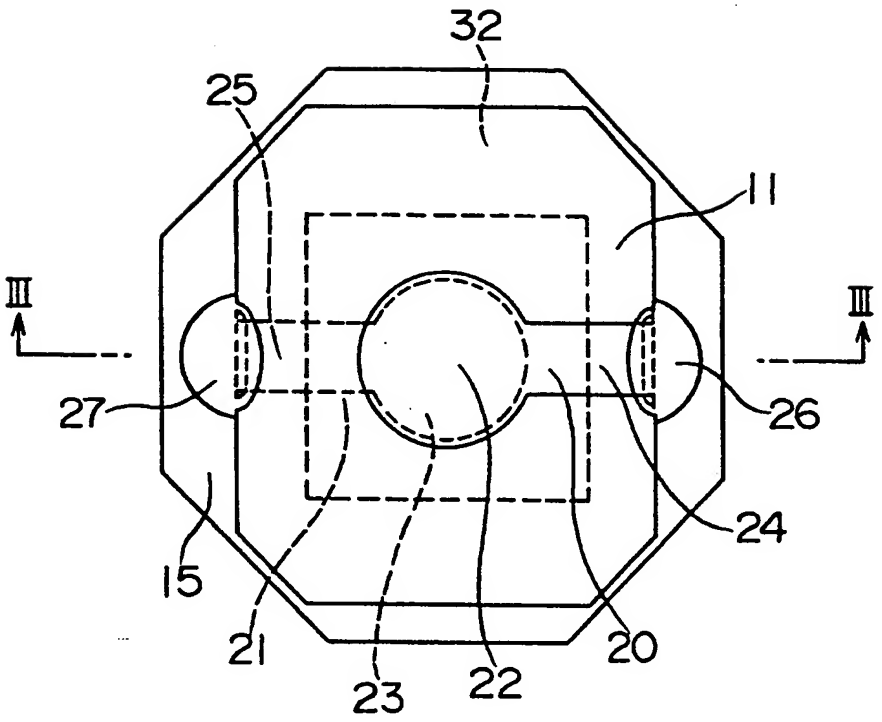

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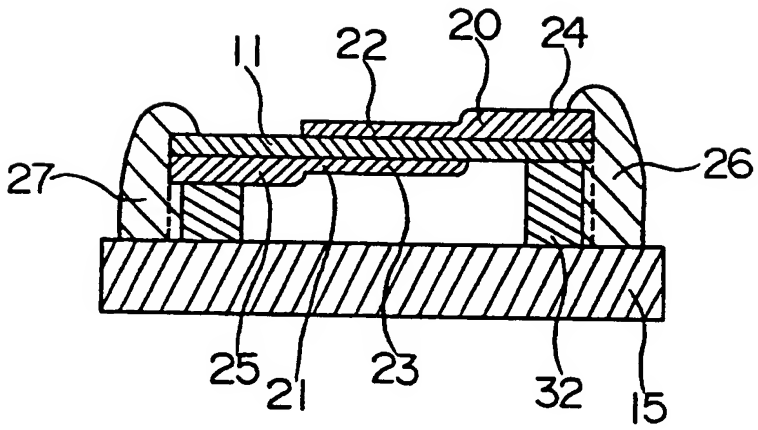

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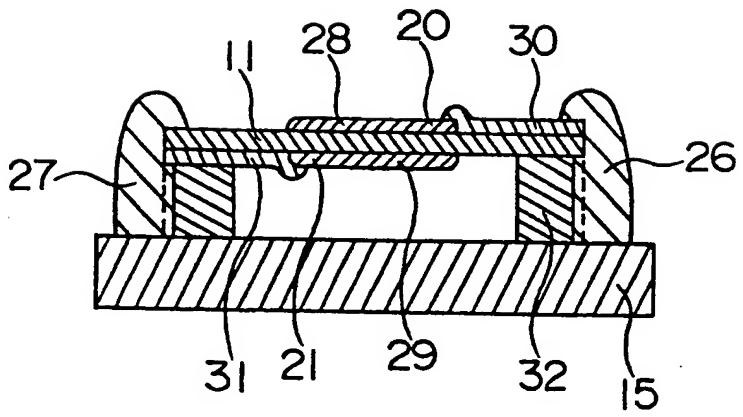

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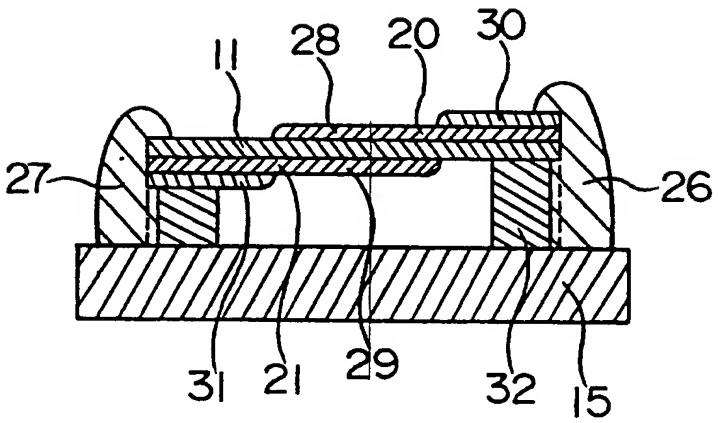

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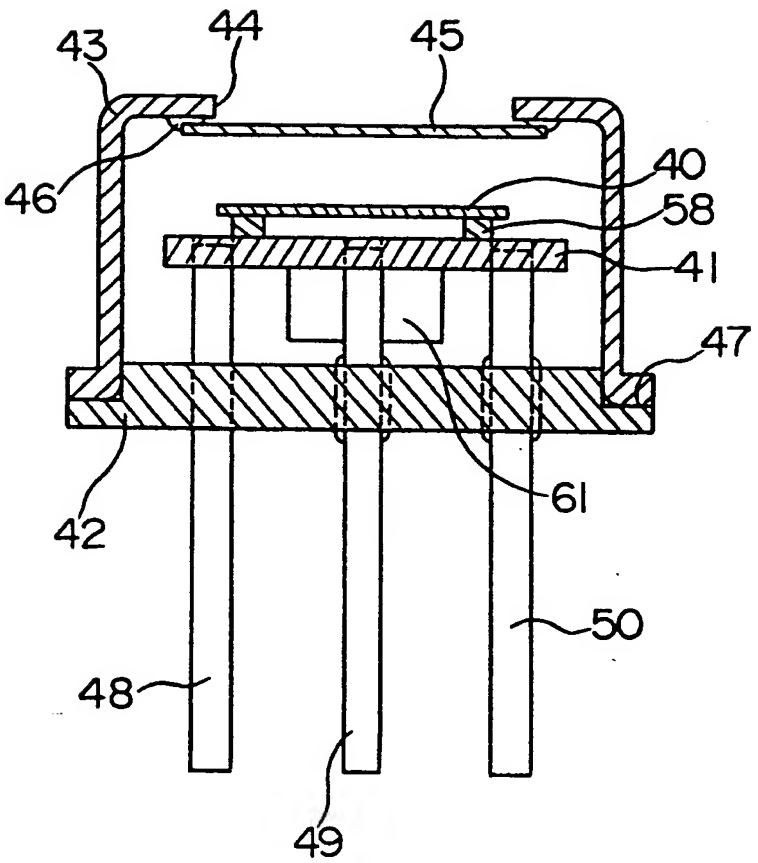

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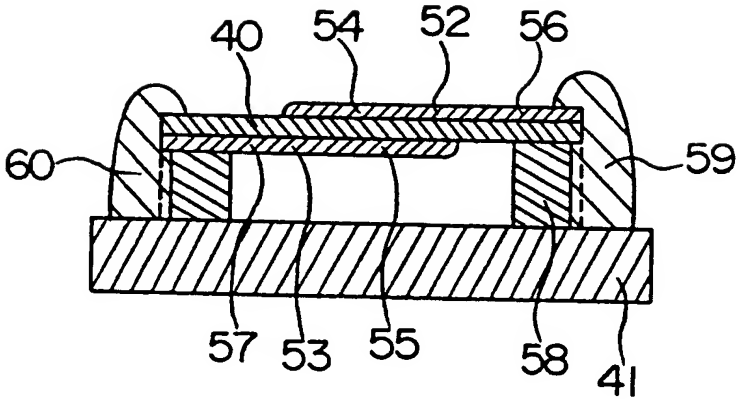

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP92/01211

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl^5 G01J1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl^5 G01J1/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP, A, 59-87327 (Toshiba Corp.), May 19, 1984 (19. 05. 84), (Family: none)	1-6
Y	JP, A, 61-170626 (Matsushita Electric Ind. Co., Ltd.), August 1, 1986 (01. 08. 86), Lines 6 to 7, upper right column, page 2, Fig. 3 (Family: none)	1, 2
Y	JP, U, 55-34291 (New Nippon Electric Co., Ltd.), March 5, 1980 (05. 03. 80), (Family: none)	3-5
Y	JP, U, 2-72943 (Murata Mfg. Co., Ltd.), June 4, 1990 (04. 06. 90), Figs. 4, 5 (Family: none)	6

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
December 22, 1992 (22. 12. 92)	December 22, 1992 (22. 12. 92)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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